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GROWTH RATES OF CURRICULUM-BASED MEASUREMENT-WRITTEN
EXPRESSION AT THE ELEMENTARY SCHOOL LEVEL

A Thesis Proposal
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Specialist in Education

By
Amanda Tadatada

May 2011

GROWTH RATES OF CURRICULUM-BASED MEASUREMENT-WRITTEN
EXPRESSION AT THE ELEMENTARY SCHOOL LEVEL

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43 pages

Directed by: Dr. Carl Myers, Dr. Reagan Brown, and Dr. Cassie Zippay

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This project appears to be the first to determine growth rates for writing using Curriculum-Based Measurement-Written Expression (CBM-WE). Growth rates, or the amount of change over time, help educators track how much progress can be expected given typical instruction. CBM-WE probes were administered to a sample of 1,004 students in first through fifth grades within a school district. The writing probes were scored using production-dependent variables: Total Words Written (TWW), Words Spelled Correctly (WSC), and Correct Word Sequence (CWS). Data were analyzed by grade level and gender. Results are presented as weekly growth rates. Growth rates were calculated from fall to winter, winter to spring, and from fall to spring. This study found higher growth rates in the lower grades and the lowest growth rates in fifth grade. Negative growth was found when examining winter to spring scores for students in third through fifth grades. Girls typically showed more improvement than boys. Results will be beneficial for educators to understand and monitor elementary student progress in written expression.

Introduction

Writing is a common tool used for communicating ideas and knowledge. According to The National Assessment of Educational Progress, the 2002 writing assessments indicated that 72% of 4th graders, 69% of 8th graders, and 77% of 12th graders were performing below a proficient level (Persky, Daane, & Jin, 2003). In 2008, the National Center for Education Statistics reported that only about one third of eighth graders and one fourth of twelfth graders were writing at the proficient or advanced levels (Salahu-Din, Persky, & Miller, 2008). According to the 2008 statistics, those students who performed at an advanced level were able to show superior writing abilities. Those students performing at the proficient level were able to demonstrate an understanding of challenging material. Unfortunately, the majority of students could not demonstrate the skills required to write at grade level.

The statistics on the high number of students being unable to write proficiently are of great concern. Many students are required to write on tests to show their knowledge or to write stories and poems for writing portfolios. Robinson and Howell (2008) noted deficits in written expression skills play a major role in troubles within the classroom as reading and writing are the two most common reasons for a referral for special education services. In addition to its use in schools, the National Commission on Writing (2006) noted that over 90% of professionals reported writing skills as necessary for their jobs. Thus, it is important to find ways to improve students' writing abilities.

Identifying and providing supports for those students struggling with writing is important. Brief measures of writing fluency have been developed as indicators of general writing abilities and are used to determine which students are at risk, not making

progress, and/or in need of early interventions in writing. Such brief measures of academic fluency, called Curriculum-Based Measurement (CBM), have been developed for the basic academic areas of reading, math, spelling, and written expression. The use of CBM in the area of reading has been thoroughly researched and is extensively supported in the literature. However, the use of CBM measures of written expression has not received much attention in the research literature.

A recent project by Youngman (2010) developed CBM-Written Expression (CBM-WE) norms for students in first through fifth grades for a school district. The development of such norms allows the district to convert future students' raw scores into percentile ranks, allowing for a determination of a student's relative skill level with writing skills. The development of norms adds to the research base on CBM-Written Expression. However, as noted by Hosp, Hosp, and Howell (2007), there is no research related to students' growth rates on brief measures of writing fluency. Thus, it is unknown how rapidly students' writing skills improve over the course of the school year at different grade levels. Establishing growth rates also provides a guide to educators to know whether a specific written expression intervention is effective or whether most students would have made the same amount of gains without the intervention. The current research will use Youngman's (2010) data set to examine growth rates of CBM-WE to determine how much elementary school students' writing improves from fall to spring, given typical instruction.

Literature Review

Curriculum-Based Measurement

Curriculum-Based Measurement (CBM) consists of standardized, simple, and brief fluency measures of basic academic skills. Such brief fluency measures are meant to serve as indicators of student achievement (Cusumano, 2007; Shinn & Bamonto, 1998). As indicators, CBM measures are not meant to be thorough assessment tools. However, CBM can be administered to students for a variety of reasons, including determining if they are on target for learning skills within the curriculum or if they may be at risk for future academic difficulties. CBM is also an effective means to monitor student progress.

There are several types of CBM for the different academic areas and each will be described. Of the four types of CBM (i.e., reading, spelling, mathematics, and writing), reading is the most widely researched. This is likely due to the fact that many students struggle with reading. According to Daly, Chafouleas, and Skinner (2005), 2002 data from the National Center for Educational Statistics showed that only one-third of 4th, 8th, and 12th graders were reading at or above a proficient level.

CBM reading is separated into early reading and oral reading fluency (Hosp et al, 2007). Early reading fluency assesses a student's ability to quickly identify and name letter sounds (letter sound fluency) and words (word identification fluency). These two measures are designed to be given to students in kindergarten or first grade as a way to assess early reading skills that are essential for becoming a successful reader. Letter sound fluency measures how many letter sounds, not the names of the letters, a student can name in one minute. Word identification fluency measures how many words a student can correctly identify within one minute. Oral reading fluency is a measure that

can be used as early as first grade to assess how many words a student can correctly read from a passage within one minute (i.e., the student's reading fluency rate). CBM-reading assessments must be administered individually to each student.

A second type of CBM is spelling, which can be administered to students beginning in the first grade. CBM-spelling is used to determine a student's spelling abilities by counting the correct letter sequences (CLS) they write (Cusumano, 2007). For example, if the word is "boat" and the child writes "bote," he would receive a score of two CLS for correctly writing the "b" and the "o" together at the beginning of the word. CLS is used rather than whole word spelling because it is more sensitive to student improvement. Whereas whole word scoring would give a student either 0 or 1 point, CLS allows for more points based on the length of the word and how many correct letters in the right sequence are written.

A third type of CBM is mathematics. Students are given a math computation sheet that contains either single calculation problems (e.g., all addition) or mixed skill problems (e.g., addition and subtraction). Students are timed to see how many problems they can complete; the exact timing varies by grade with first through third graders receiving two minutes and older students receiving four minutes. Similar to the way spelling is scored, the number of digits correct (DC) is counted rather than number of correct answers (Cusumano, 2007).

The final area of CBM is written expression. This type of CBM can be administered beginning in the first grade and assesses a student's writing abilities. Students are given a writing probe, which consists of a story starter provided at the top of a piece of lined paper or orally presented by the teacher (Cusumano, 2007). Story starters

are defined as the beginning of an oral or written sentence followed by an ellipsis (Gansle et al., 2004). Story starters are a means to prompt the writing process and require more than a yes/no or short-answer response. Students are instructed to think about the prompt for one minute and are then given three minutes to write (Cusumano, 2007). As the focus of this current thesis research is on writing, more specific aspects of CBM-Written Expression will be explained throughout the literature review.

Key Features of CBM

There are several key features of CBM. These include the use of standardized procedures for administration and scoring, the use of multiple forms, the ability to administer CBM to students frequently, time efficiency, and the ability to directly measure academic performance (Deno, 2003; Espin, Weissenburger, & Benson, 2004; Robinson & Howell, 2008). The first key feature of CBM is the standard procedures for administration and scoring. Each type of CBM (i.e., reading, writing, mathematics, and spelling) has specific administration instructions, student directions, time limits, and scoring procedures (Deno, 2003). Standardized administration and scoring enhances the reliability of the measure by increasing accuracy and consistency. Standardized procedures also allow for comparison of CBM scores among individuals and/or groups (Deno, 2003).

A second key feature of CBM is the use of multiple forms. Students can be administered CBM probes often because of the availability of different, but equivalent forms. For example, a student completing CBM oral reading fluency would read one passage the first time it is administered, a different passage the second time, and so forth (Deno, 2003). This reduces the problem of a student learning and remembering what was

on the previous CBM measure. The ability to administer different forms allows for the third key feature of CBM, frequent use (Espin et al., 2004). With frequent use of CBM, student progress, or lack thereof, may be easily monitored.

CBM's fourth key feature is its effective use of time (Espin et al., 2004; Robinson & Howell, 2008). CBM probes take one to three minutes to complete, depending on what skill is being measured (Deno, 2003). In addition, most types of CBM (e.g., spelling, writing, math) can be administered to an entire classroom of students at one time and only require a total time of five to ten minutes for passing out materials, giving instructions, completing the task, and collecting the work. CBM early reading and oral reading fluency must be administered individually.

A final key feature of CBM is its use for directly measuring academic performance (Deno, 2003). Each CBM probe can be used to gain a sample of a student's skills. For example, CBM oral reading fluency can provide a teacher with information on a student's reading skills. In addition, scores on CBM math or spelling probes, obtained by counting the number of correct responses within the time limit, provides direct measures of academic skills.

Advantages of CBM

The advantages to using CBM instead of other forms of standardized testing are quite similar to some of the key features previously mentioned. The first advantage is the simplicity of CBM. The simple and quick administration of CBM is a great advantage over other forms of testing (Espin et al., 2004; Robinson & Howell, 2008). Many standardized tests take hours to administer and must be administered by highly trained professionals. In addition, scoring standardized tests can take longer than scoring CBM.

A second advantage to CBM is the usefulness for progress monitoring. Multiple CBM forms allow for retesting within short periods of time with little concern of practice effects (i.e., the student getting the answer correct because they remembered the answer from the previous time they took the test). In addition, CBM is sensitive to growth over short periods of time (McMaster & Espin, 2007; Robinson & Howell, 2008). Thus, CBM can be used weekly, even daily, to assess a student's progress within the curriculum. Typical standardized achievement test scores remain stable and do not reflect progress over short time periods (Hosp et al., 2007).

A third advantage is the ability to use CBM to measure specific skills a student learns within the curriculum. Smaller sets of skills can be measured by CBM (e.g., looking at only addition skills or only multiplication skills in mathematics) versus a wide range of skills that many standardized tests assess. A fourth advantage is that students must perform the actual skill when being assessed with CBM. This is called a production response. For example, a student must actually read or write a passage. Other tests often require a student to simply circle the correct answer, which is called a selection response (Hosp et al., 2007; Shinn, 1989). By performing the actual skill, teachers can gain a sense of a student's struggles with specific aspects of the skill.

Uses of CBM

There are many uses of CBM including: (a) screening/benchmarking, (b) progress monitoring, (c) determining the effectiveness of an intervention, and (d) predicting performance on high-stakes assessments. CBM is commonly used for screening/benchmarking. According to Deno (2003), the purpose of screening/benchmarking is to identify students that are at risk for future learning

difficulties. As a screener, all students in a school or classroom are administered CBM probes. The students who score below a certain percentile rank are identified as “at risk” and can then receive additional educational supports to improve their performance. Screening/benchmarking typically occurs at least three times a year: once in the fall a few weeks after school begins, once in the winter either before or shortly after winter vacation, and once in the spring a few weeks before the end of the school year. Students can be screened using any or all of the forms of CBM (i.e., reading, writing, spelling, mathematics).

A second possible use of CBM is for progress monitoring, or the repeated administration of CBM probes. Once a student’s present level of performance is determined and a goal is set, monitoring helps determine whether or not a student is reaching their goals or progressing toward them (McMaster & Campbell, 2008). Typically, students identified by the school-wide screening as at risk or those students already identified with specific learning disabilities will receive progress monitoring. When progress monitoring, CBM is typically administered fairly frequently. How often is determined on an individual basis, but it could be as frequent as multiple times a week or as little as once or twice a month.

Determining the effectiveness of an intervention goes hand-in-hand with progress monitoring. Those students determined as at risk during the school-wide screening might be given some type of academic intervention (e.g., extra small group instruction time, different curriculum). Progress monitoring then lends information about a student’s responsiveness to the intervention that was put in place (Deno, 2003; Robinson &

Howell, 2008). If little or no progress is being made, a change in intervention or other changes in instruction need to occur.

Another use of CBM is predicting students' performance on high-stakes assessments. Studies by Espin et al. (2004) and McMaster and Espin (2007) have shown that CBM has high criterion validity (i.e., how well one test relates to another test in the same area) and it is for that reason that CBM data are being used to predict whether or not a student will pass standardized tests administered across a state (Deno, 2003; Sloan, 2005).

CBM-Written Expression

CBM-Written Expression (CBM-WE) is a way to measure students' writing skills. Students are given a story starter and three minutes to write. The same story starter on a writing probe should not be used within the same year, but new ones should be equivalent in grade level difficulty (Hosp et al., 2007). It is not clear, however, how story starters are determined to be appropriate for a certain grade level. There are story starters for various grade levels available through websites and companies. For example, AIMSweb (2008) is one that is commonly used by school districts. Hosp et al. (2007) also offer several primary and intermediate story starter examples in their book on CBM. Neither source describes how story starters are deemed appropriate for specific grade levels.

Scoring CBM-WE probes can be time-consuming. Malecki and Jewell (2003) were apparently the first to examine the time it takes to score writing probes. The time it took three different raters to score twenty writing probes from students in Grades 1 through 8 was measured. Longer scoring times were found for probes completed by

students in middle school (Grades 6 through 8). For all grades, Malecki and Jewell found that it took between 21 to 31 seconds to score total words written (TWW), between 25 to 37 seconds to score words spelled correctly (WSC), and between 46 to 82 seconds to score correct word sequence (CWS). Combined scoring times (TWW, WSC, and CWS) averaged between 93 to 150 seconds per writing probe. Though longer scoring times were present at higher grade levels, it took only about two and a half minutes to score a writing probe with all three indices at the middle school level.

Traditional CBM-WE scoring methods. Total words written (TWW), words spelled correctly (WSC), and correct word sequence (CWS) are the most common methods of scoring CBM-WE (McMaster & Campbell, 2008; Powell-Smith & Shinn, 2004). TWW is found by counting the total number of words written by a student on a CBM-WE probe. Any group of letters is counted as a word, even if the letters do not actually spell out a recognizable word. Numerals that are written out are counted as words. The only written numerals that are counted are dates (e.g., August 2, 2010) and currency (e.g., \$50 or 50 dollars). Common abbreviations (e.g., Mrs. or Dr.) are counted as words. Story titles, if included, are also counted as words (Gansle, Noell, Vanderheyden, Naquin, & Slider, 2002).

WSC can be determined by counting the total number of words spelled correctly on the CBM-WE probe. This includes any words that are spelled correctly, even if they are not used in the correct context. For example, in the sentence “They went over their,” the word “their” would be counted as spelled correctly even though it is not correct within the context of the sentence. In addition, proper nouns must be capitalized correctly unless the name is a common noun (e.g., Bill or bill). Letter reversals are not counted as

errors unless the reversal makes a new letter that causes the word to be spelled incorrectly. For example, a reversed *-b-* in “big” makes “dig,” a correctly spelled word, but a reversed *-p-* in “pig” makes “qig,” which is not a word (Gansle et al., 2002; Hosp et al., 2007).

Finally, CWS is determined by counting every pair of two adjacent words that are spelled correctly and are acceptable within the context of the sentence. For example, using the previous sentence, “They went over their,” the student would not get credit for the pair of words “over” and “their” because “their” is not acceptable in the context of the sentence. Capitalization is necessary at the beginning of a sentence and proper nouns must be capitalized. Correct punctuation must be at the end of a sentence and commas are only counted if they are used in a series (e.g., red, blue, green, and gold). In addition, words must be semantically and syntactically correct (Gansle et al., 2002).

Non-traditional scoring methods. Although TWW, WSC, and CWS are the traditional methods of scoring CBM-WE, other scoring methods have also been tested. Various scoring methods have included parts of speech, long words, correct capitalization, punctuation marks, correct punctuation marks, words in complete sentences, simple sentences, computer-scored variables, mature words, percentage of legible words, percentage of words correctly spelled (%WCS), percentage of correct writing sequences (%CWS) and correct minus incorrect writing sequence (CIWS) (Gansle et al., 2002; Gansle et al., 2004; Jewell & Malecki, 2005; Malecki & Jewell, 2003). Research from Gansle et al. (2002) found that complete sentences and the WordPerfect® Flesch-Kincaid Grade Level computer scoring method might be useful

additional forms of scoring. More research should be conducted with non-traditional forms of scoring CBM-WE as results are promising in this area.

Most of these methods of scoring can be split into three major categories: production-dependent (e.g., TWW, WSC, CWS), production-independent (e.g., %WCS and %CWS), and accurate-production (e.g., CIWS). The production-dependent measures are methods of scoring that are dependent upon how much the student writes, thus measuring writing fluency. Production-independent measures are independent of the length of the writing sample, thus measuring accuracy of the student's writing. Accurate-production measures both writing fluency and accuracy (Jewell & Malecki, 2005).

Malecki and Jewell (2003) and Jewell and Malecki (2005) conducted similar research studies to determine the usefulness of scoring CBM-WE probes with production-dependent, production-independent, and accuracy-production measures at different grade levels. Both studies examined similar questions. The first was whether or not there are gender differences in writing ability. The second question investigated differences in students' writing at different grade levels. In their 2003 study, Malecki and Jewell used students in Grades 1 through 8. In their second study, Jewell and Malecki used only second, fourth, and sixth grade students.

All participants were administered CBM-WE by their teachers following standardized procedures (Jewell & Malecki, 2005; Malecki & Jewell, 2003). Malecki and Jewell had teachers administer CBMs in both the fall and the spring. Students' grade levels were separated into three groups for analyses: early elementary students (Grades 1 and 2), elementary students (Grades 3, 4, and 5), and middle school students (Grades 6, 7,

and 8). Jewell and Malecki (2005) only administered CBM probes in the fall of the school year.

Although Malecki and Jewell (2003) used a wider range of students in the original study, that study and their 2005 study found similar results. In both studies, girls outperformed boys on production-dependent measures (i.e., TWW, WSC, and CWS) at all grades, basically meaning girls write more than boys (Jewell & Malecki, 2005; Malecki & Jewell, 2003). One major difference between the two studies is that only results from Malecki and Jewell (2003) found that girls outperformed boys on production-independent (%WSC and %CWS) and accurate-production indices (CIWS) at all grade levels (Grades 1 through 8). As would be expected, scores increased as grade level increased. Thus, older students (eighth graders in the 2003 study and sixth graders in the 2005 study) scored the highest on all CBM measures and early elementary school students (first graders in the 2003 study and second graders in the 2005 study) had the lowest scores. This indicates that, as students grow older, writing skills tend to mature and CBM-WE can be used to measure that rate of growth.

Malecki and Jewell (2003) had CBM probes administered in both the fall and the spring so changes over time within the same grade level could be examined. Results indicated scores in the spring were significantly higher than scores in the fall for TWW, WSC, and CWS at all grade levels. Similarly, CIWS scores were higher in the spring than in the fall at all grade levels. The production-independent indices (%WSC and %CWS) were only significantly higher in the spring for early elementary students (Grades 1 and 2), suggesting that this type of scoring method may not be the best to use at all grade levels.

Reliability and validity of CBM-WE. Many researchers have found CBM-WE to be a useful, reliable (i.e., accurate and consistent), and valid (i.e., measuring what it claims to measure) measure of student progress in writing (Espin et al., 2004; McMaster & Campbell, 2008; McMaster & Espin, 2007). In their literature review of previous research, Espin et al. concluded that at the elementary school level, 3- to 5-minute writing samples in response to a story starter, a topic sentence, or a picture were reliable and valid measures of student performance in writing. Strong correlations were found when these probes were scored with TWW, WSC, and CWS. For each of these methods of scoring, interscorer reliability ranged from $r = .92$ to $.99$, internal consistency ranged from $r = .96$ to $.99$, test-retest reliability ranged from $r = .81$ to $.92$, and alternate-forms reliability ranged from $r = .95$ to $.96$. In addition, research at the secondary school level (middle and high school) indicated 5-minute responses to narrative story starters or descriptive essays were valid and reliable measures of student writing performance when scored using CWS or correct minus incorrect word sequence. Alternate-forms reliability for these two forms of scoring ranged from $r = .78$ to $.80$ and correlations with other measures of writing ranged from $r = .61$ to $.83$ (Espin et al., 2004).

Another research review conducted by McMaster and Espin (2007) examined the reliability and validity of CBM-WE as well as the usefulness at the elementary, middle and high school levels. McMaster and Espin used nine studies found in a literature search by the Research Institute on Progress Monitoring at the University of Minnesota. An additional 17 technical reports on writing accessed from the Institute for Research on Learning Disabilities (IRLD) at the University of Minnesota were also examined.

McMaster and Espin (2007) also concluded that CBM-WE is a reliable and valid measure of writing ability. Moderate to strong correlations were found for test-retest reliability and alternate forms reliability ($r_s = .51$ to $.96$). Researchers speculate that inconsistencies found between alternate forms of CBM-WE may be due to a variety of reasons including the possibility that students may have more to say about certain topics. McMaster and Espin also found strong correlations for internal consistency (i.e., CBM-WE scores within a single student's writing sample) and for interscorer reliability ($r_s = .90$ and up).

Similarly, for criterion validity (i.e., a test measuring what it claims to measure) correlations were moderate to strong ($r_s = .69$ to $.88$) when comparing CBM-WE TWW and WSC to the Test of Written Language (TOWL) and the Developmental Scoring System (DSS). Correlations were weaker when comparing CBM-WE CWS and the DSS ($r = .49$). McMaster and Espin (2007) noted the weaker correlations could be due to CWS being a more subjective way of scoring versus the straightforward forms of scoring like TWW and WSC. McMaster and Espin looked at scores over grade levels and found statistically significant differences. This means that there were differences between the number of TWW, WSC, and CWS that students produced depending on their grade level.

McMaster and Espin (2007) were also interested other aspects of CBM-WE at different grade levels. At the elementary school level (Grades 1 through 5) McMaster and Espin found statistically significant differences between students with learning disabilities and those in general education. Students in the general curriculum performed better when scoring CBM-WE with TWW, WSC, and CWS. Students also showed gains in TWW, WSC, and CWS from fall to spring. McMaster and Espin noted a few studies

showed that student writing improved in quantity (how much), but not necessarily in quality (how well). At the secondary level (Grades 6 through 12), studies found that more complex scoring procedures or multiple scoring procedures might be more useful for scoring CBM-WE in middle and high school students. For example, combinations of characters per word, sentences, and mean length of correct word sequences (ML/CWS) showed higher correlations than any one of these alone (McMaster & Espin, 2007). In addition, using correct minus incorrect word sequence (CIWS) could be a more appropriate complex form of scoring CBM-WE at the secondary level (McMaster & Espin, 2007).

A study conducted by McMaster and Campbell (2008) further explored the usefulness of CBM-WE by examining different writing tasks, durations, and scoring procedures. Third, fifth, and seventh graders were used in this study. All students completed several different types of writing tasks including two passage-copying tasks and two picture, two narrative, and two expository writing prompts. All students were given 1.5 minutes to complete the copying task. All other tasks were given a five-minute time limit, having students make a slash mark where they were when three minutes expired. In addition, seventh grade students were asked to make a slash mark at the five-minute mark and to continue writing for a total of seven minutes. The scoring procedures used for each of these tasks were TWW, WSC, CWS, and CIWS. All probes were administered over three sessions.

In terms of alternate forms reliability, McMaster and Campbell (2008) found mixed results. For passage copying tasks, reliability coefficients for TWW, WSC, and CWS were strong ($r_s = .79$ to $.95$) for students in Grade 3, but not for CIWS or students

in Grade 5 or 7. Picture prompt tasks and narrative prompts were reliable at 3- and 5-minute durations for Grades 3 and 5 for all four of the scoring procedures. None of the scoring procedures were reliable for expository writing prompts in students' writing in Grade 3. McMaster and Campbell discovered that longer writing times and more complex scoring procedures (e.g., CWS and CIWS) were needed for more reliability in writing prompts at Grades 5 and 7. This held true for picture prompts (Grade 5 only), narrative prompts, and expository prompts.

McMaster and Campbell (2008) concluded that the use of 5-minute narrative writing prompts were most useful for screening across Grades 3, 5, and 7. Passage copying tasks may be useful for screening at Grade 3. Narrative and expository passages scored with more complex procedures (e.g., CWS or CIWS) are useful for showing growth in Grades 5 and 7 and could possibly be used as progress monitoring tools.

CBM and Growth Rates

CBM is a great tool for progress monitoring students, but it is also important to know how much progress can be expected given typical instruction. Without knowing how average students perform and how much their skills grow within the curriculum, it is difficult to accurately interpret the progress of any students receiving extra instruction or an academic intervention. That is, just because a student improves in a certain area does not necessarily mean the improvement was due to a specific intervention. Measuring growth rates or the amount of change over time is one way to provide a basis of comparison. Research on growth rates and CBM has been conducted in the areas of reading, spelling, and math and examples in those areas will be briefly described.

In the first example, Fuchs, Fuchs, Hamlett, Walz, and Germann (1993) administered CBM reading, spelling, and math to students once a week for one year and then examined how much growth students made from the beginning of the year to the end of the year. Fuchs et al. were able to determine a realistic amount of how many words, letters, or correct digits that a student should gain per week to make adequate progress by calculating the slope of the data obtained. For example, on average, students in Grade 1 improved their reading fluency rate by two words per week. In another study interested in the use of CBM for universal screening of student progress in reading, Ardoin and Christ (2008) examined the slopes for CBM-reading benchmarks. Results from this study indicated that there was more growth from fall to winter than from winter to spring.

While CBM reading growth rates have been documented, little has been done in the area of CBM-WE. At best, research has shown that, during a school year, CBM-WE scores increased from fall to spring, with significantly higher scores in the spring (Malecki & Jewell, 2003; McMaster & Espin, 2007). However, those authors provided no details as to growth rates. According to Hosp et al. (2007), “There currently is no research on Writing CBM related to growth rates and benchmarks” (p. 93).

Purpose of Present Research

Due to the lack of research on CBM-WE growth rates, the current research focuses on this topic. Approximately two years ago, local norms for CBM-WE were created for the Bowling Green Independent Schools in Bowling Green, Kentucky using students in Grades 1 through 5 at all five of the district’s elementary schools (Youngman, 2010). The data set used by Youngman was evaluated to determine growth rates of students’ written expression skills as measured by CBM fluency measures.

Fuchs et al. (1993) established the method of determining an average amount of growth per week with CBM in the areas of reading, math, and spelling. Determining a weekly rate of progress has the advantage of flexibility in allowing a determination of expected growth over any number of weeks. Thus, regardless of whether a teacher wants to implement an intervention for five weeks, or there is 12 weeks left in the school year, the weekly growth rate is simply multiplied by a certain number of weeks to determine an expected level of growth. This research also determined average weekly growth rates for each of the production-dependent variables used to score the CBM-WE probes (i.e., TWW, WSC, CWS) for students in Grades 1 through 5. The weekly growth rates were also determined for boy and girls separately, as previous research indicated girls tend to score higher on measures of writing than boys (Jewell & Malecki, 2005; Malecki & Jewell, 2003). In addition, all mean scores for all grade levels were graphed to illustrate a pattern of growth from the fall of Grade 1 to spring of Grade 5. The graph provides a visual representation of students' growth in written expression skills over the elementary grade levels.

Method

Participants

The participants were students in grades 1 through 5 attending all five elementary schools within the Bowling Green Independent School District. An attempt was made to include all elementary school students in grades 1 through 5 as participants. It is unknown exactly what percentage of students the sample consisted of, but the vast majority of the students were included. Only those students absent on the days of the testing were excluded. The students were administered CBM-WE probes three times during the 2008-2009 academic year. The actual number of students assessed at any one time (i.e., fall, winter, or spring) was just over 1,300. However, due to student absences on one of the days the assessments took place and students moving in and out of the district, only data from those who participated in all three benchmarks, a total of 1,004 students, were used in this study. Demographic information collected included gender, ethnicity, presence of a disability, and limited English proficiency (LEP). This information is presented in Table 1 by grade level. As can be seen in Table 1, the sample consisted of a rather diverse group of students (36.3% non-Caucasian) with a fairly substantial number of LEP students (18.7%).

Materials

A total of 15 AIMSweb (2008) story starters were used for data collection (5 grade levels x 3 administration sessions). AIMSweb provides lists of story starters separated into three groups: primary, intermediate, and advanced. For this study, primary story starters were used for grades 1, 2, and 3 and intermediate story starters were used for grades 4 and 5. Selection of which story starter would be appropriate to

Table 1

Demographic Information of Participants

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Gender						
Boys	104 (50.2)	100 (48.1)	94 (46.1)	135 (61.4)	79 (47.9)	512 (51.0)
Girls	103 (49.8)	108 (51.9)	110 (53.9)	85 (38.6)	86 (52.1)	492 (49.0)
Ethnicity						
Caucasian	126 (60.9)	122 (58.7)	135 (66.2)	139 (63.2)	118 (71.5)	640 (63.7)
African American	35 (16.9)	42 (20.2)	38 (18.6)	43 (19.5)	24 (14.5)	182 (18.1)
Hispanic	36 (17.4)	28 (13.5)	21 (10.3)	29 (13.2)	11 (6.7)	125 (12.5)
Asian	5 (2.4)	8 (3.8)	5 (2.5)	4 (1.8)	7 (4.2)	29 (2.9)
Other	5 (2.4)	8 (3.8)	5 (2.5)	5 (2.3)	5 (3.0)	28 (2.8)
Disability						
No	174 (84.1)	171 (82.2)	169 (82.8)	187 (85.0)	136 (82.4)	837 (83.4)
Yes	33 (15.9)	36 (17.3)	35 (17.2)	33 (15.0)	29 (17.6)	166 (16.6)
LEP						
No	161 (77.8)	166 (79.8)	168 (82.4)	183 (83.2)	137 (83.0)	815 (81.3)
Yes	46 (22.2)	41 (19.7)	36 (17.6)	37 (16.8)	28 (17.0)	188 (18.7)

administer was not random, but based on the clinical judgment of a school psychology graduate student and school psychology faculty member on the likely interest level of the topic to students (Youngman, 2010). Each story starter was provided to the students on a sheet of lined paper with the story starter printed at the top. A list of story starters used is provided in Appendix A.

Procedures

All procedures for data collection and analysis were previously approved by Western Kentucky University's Human Subjects Review Board (see Appendix B).

Probe administration. Approximately 15 professional employees of the school district (i.e., guidance counselors, school psychologists) administered the CBM-WE probes to students in classrooms in grades 1 through 5. Prior to this, all school personnel administering the CBM-WE probes attended an hour long training session on administration procedures conducted by a Western Kentucky University psychology professor and one school psychology graduate student. The CBM-WE probes were administered three times (i.e., September, January, and May) during the 2008-2009 academic year. Students were assessed by classroom and all students in the district were assessed within the same two-week period of time. Students were given the sheet of lined paper containing the story starter based on their grade level. All students within one grade level were given the same story starter during each assessment period. School personnel read aloud a set of standardized instructions to the students that included reading the story starter that was printed on the students' papers. Students were allowed one minute to think about what they would write, and then wrote for three minutes. Students were

prompted to continue writing after 90 seconds had elapsed. At the end of three minutes, students were told to stop and the writing probes were then collected.

Scoring. All CBM-WE writing probes were scored by three psychology graduate students from Western Kentucky University using three production-dependent measures: TWW, WSC, and CWS. After the initial scoring of all probes, inter-rater agreement was conducted by randomly selecting 20% of the probes from each classroom to be re-scored. If, during re-scoring, any set of classroom probes did not have at least 80% inter-rater agreement on the CBM-WE scoring measures for that classroom, all probes from that classroom were re-scored. The differences in scores were discussed and resolved between the raters and new scores for that measure were recorded. A minimum of 80% between observers is considered the standard minimum level of acceptable inter-rater agreement (Sattler, 2002). No probes needed to be re-scored for TWW as agreement ranged from 81% to 100%. All probes from 19 classrooms were re-scored for WSC due to inter-rater agreement ranging from 58% to 100%. All probes from 36 classrooms were re-scored for CWS as agreement ranged from 50% to 100%.

Results

Mean scores for each production-dependent variable were determined from the available data set. Mean scores were calculated for each variable by time of year (i.e., fall, winter, spring), grade, and gender. Merely determining the difference between fall and spring mean scores would be simpler, but research conducted by Ardoin and Christ (2008) found more growth from fall to winter than from winter to spring. Thus, separate growth rates were calculated for each of these time periods.

As a first step in determining the rate of growth in writing over time, simple differences were calculated between fall and winter mean scores, winter and spring mean scores, and fall and spring mean scores. The second step in calculating weekly growth rates, as reported in previous research (Fuchs et al., 1993), was to take the score differences and divide by the number of weeks between CBM-WE administrations. Although administrations of the CBM-WE probes occurred over a two week time period, the first week of testing was used for determining the number of weeks between administrations of probes. There was a total of 28 weeks between fall and spring benchmarks. There were 16 weeks, excluding one week of fall break and two weeks of Christmas break, between fall and winter benchmarks. There were 12 weeks, excluding one week for spring break, between winter and spring benchmarks.

Average weekly growth rates for TWW are listed in Table 2. The fall to winter TWW generally showed similar growth rates for Grades 1 through 4, with a drop in growth (almost in half) in the 5th grade. Similar to Ardoin and Christ's (2008) results, growth rates from fall to winter were higher than growth rates from winter to spring. In fact, negative growth rates were found in Grades 3, 4, and 5 from winter to spring. Winter

Table 2

Weekly Growth Rates for Total Words Written

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Fall to Winter					
Boys	0.55	0.53	0.60	0.61	0.37
Girls	0.65	0.64	0.86	0.58	0.35
Total	0.60	0.58	0.74	0.60	0.36
Winter to Spring					
Boys	0.21	0.13	-0.13	-0.31	-0.33
Girls	0.28	0.33	-0.22	-0.07	-0.67
Total	0.24	0.23	-0.18	-0.21	-0.51
Fall to Spring					
Boys	0.40	0.35	0.28	0.22	0.07
Girls	0.49	0.50	0.40	0.30	-0.08
Total	0.45	0.43	0.35	0.25	-0.01

to spring growth rates in the Grades 1 and 2 were only about a third the rate as they were between fall and winter. While girls frequently demonstrated higher growth rates than boys, that was not always the case. For Grades 4 and 5 from fall to winter, growth rates were fairly equivalent between boys and girls.

Table 3 lists the growth rates for WSC. Patterns of results similar to the TWW table were found. The fall to winter data generally showed relatively strong growth rates

for Grades 1 through 4, with a drop in growth in the 5th grade. When looking specifically at fall to winter growth rates, the highest growth rates are in the 3rd grade. From winter to spring, the highest growth rates are in Grade 1, although negative growth rates occurred in Grades 3, 4, and 5. Over the course of the school year in Grade 5 (fall to spring), it is interesting to note there is zero growth in this area of written expression, at least as measured by the CBM probes.

Table 4 lists results for the final production-dependent variable, CWS. The results are similar to those seen with TWW and WSC. Fall to winter growth rates are consistently higher than growth rates from winter to spring. Again, the lowest growth rates are in Grade 5.

In addition to calculating average weekly growth rates, an overall visual representation of students' growth in written expression skills as measured by the CBM-WE probes was graphed for each of the three production-dependent variables across all five grade levels. Mean scores from each CBM-WE administration were entered into Microsoft Excel, graphed, and the slopes of the trend lines were determined for boys and girls (separately). Results are shown in Figures 1, 2, and 3. Overall, the slopes across all grade levels for all three of the production-dependent variables were steeper for girls (TWW = 2.84, WSC = 3.02, CWS = 3.23) than boys (TWW = 2.45, WSC = 2.49, CWS = 2.36). A visual analysis of the graphs also indicates students' growth is not linear, as occasional drops in mean scores occurred (e.g., between the spring of 3rd grade and fall of 4th grade, and between the winter and spring of 5th grade).

Table 3

Weekly Growth Rates for Words Spelled Correctly

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Fall to Winter					
Boys	0.52	0.55	0.60	0.60	0.33
Girls	0.62	0.70	0.84	0.54	0.37
Total	0.57	0.63	0.73	0.58	0.35
Winter to Spring					
Boys	0.23	0.16	-0.08	-0.23	-0.27
Girls	0.34	0.33	-0.14	-0.03	-0.66
Total	0.29	0.25	-0.12	-0.15	-0.47
Fall to Spring					
Boys	0.40	0.38	0.31	0.24	0.07
Girls	0.50	0.54	0.42	0.30	-0.07
Total	0.45	0.46	0.37	0.26	0.00

Table 4

Weekly Growth Rates for Correct Word Sequence

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Fall to Winter					
Boys	0.39	0.46	0.59	0.44	0.35
Girls	0.53	0.65	0.78	0.46	0.41
Total	0.46	0.56	0.69	0.45	0.38
Winter to Spring					
Boys	0.15	0.22	-0.15	-0.17	-0.19
Girls	0.29	0.34	-0.07	0.01	-0.59
Total	0.22	0.28	-0.11	-0.10	-0.40
Fall to Spring					
Boys	0.29	0.36	0.27	0.18	0.12
Girls	0.43	0.52	0.41	0.27	-0.02
Total	0.36	0.44	0.35	0.22	-0.05

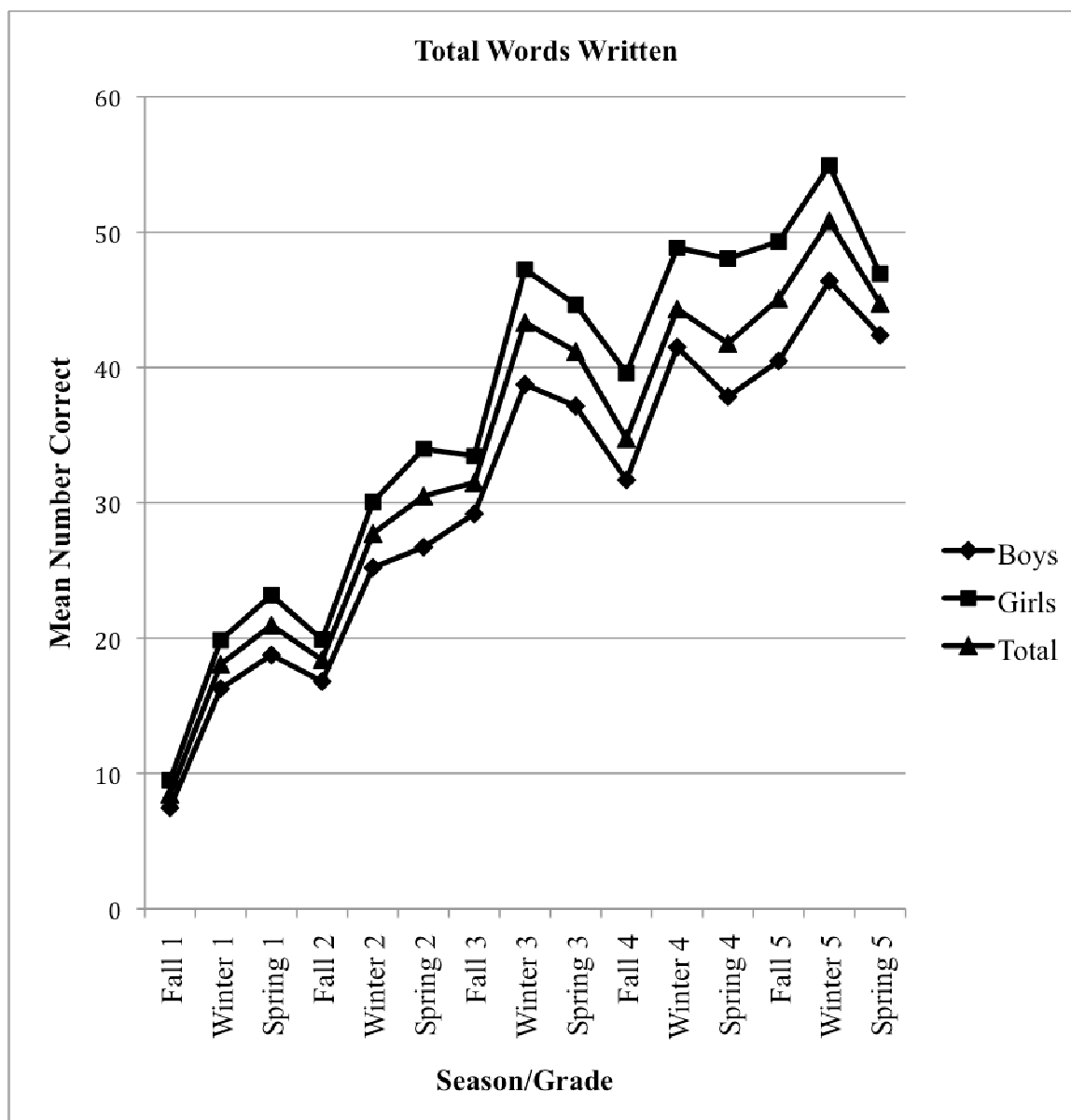


Figure 1. Overall Growth in Total Words Written for Grades 1 Through 5.

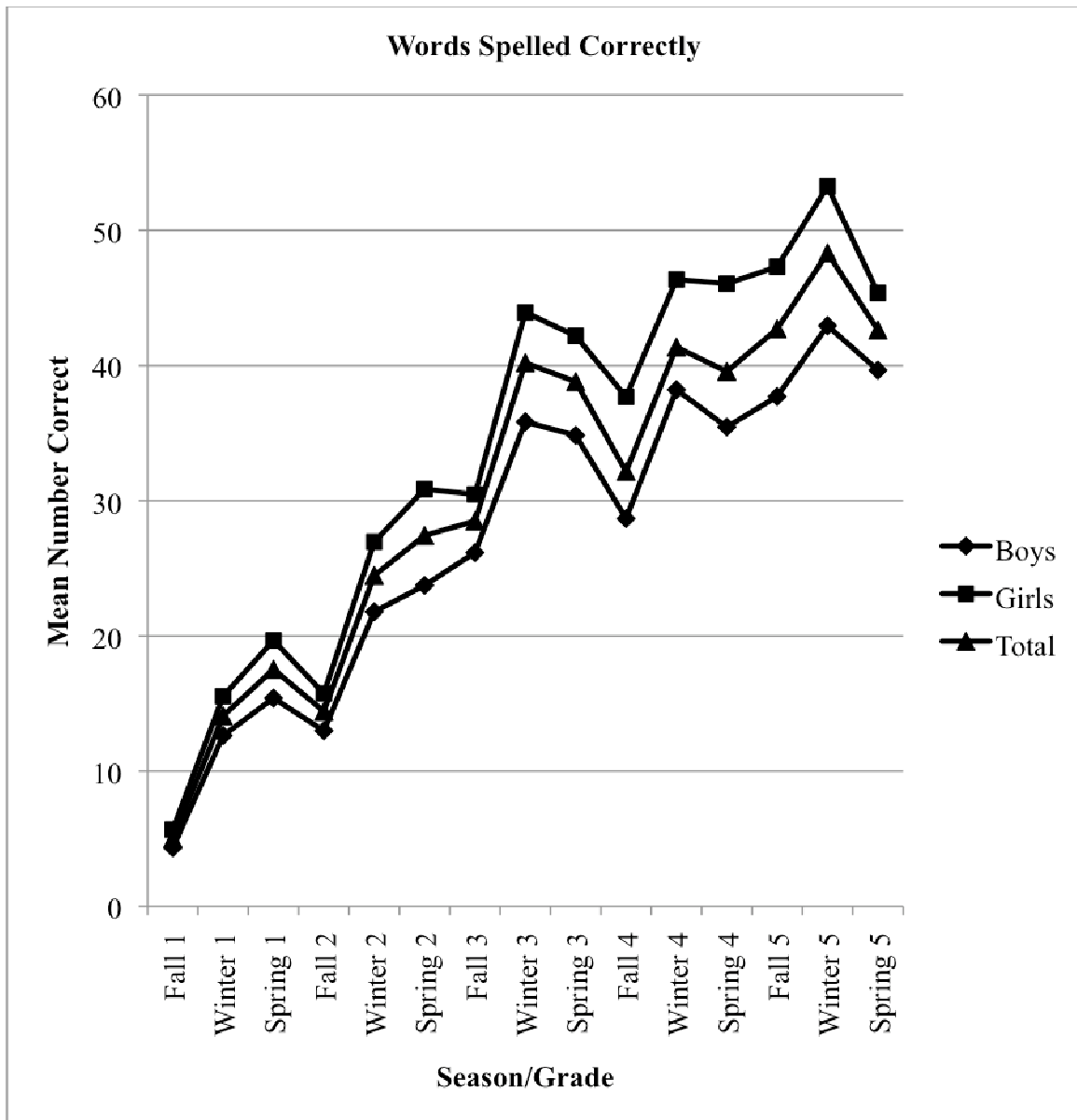


Figure 2. Overall Growth in Words Spelled Correctly for Grades 1 Through 5.

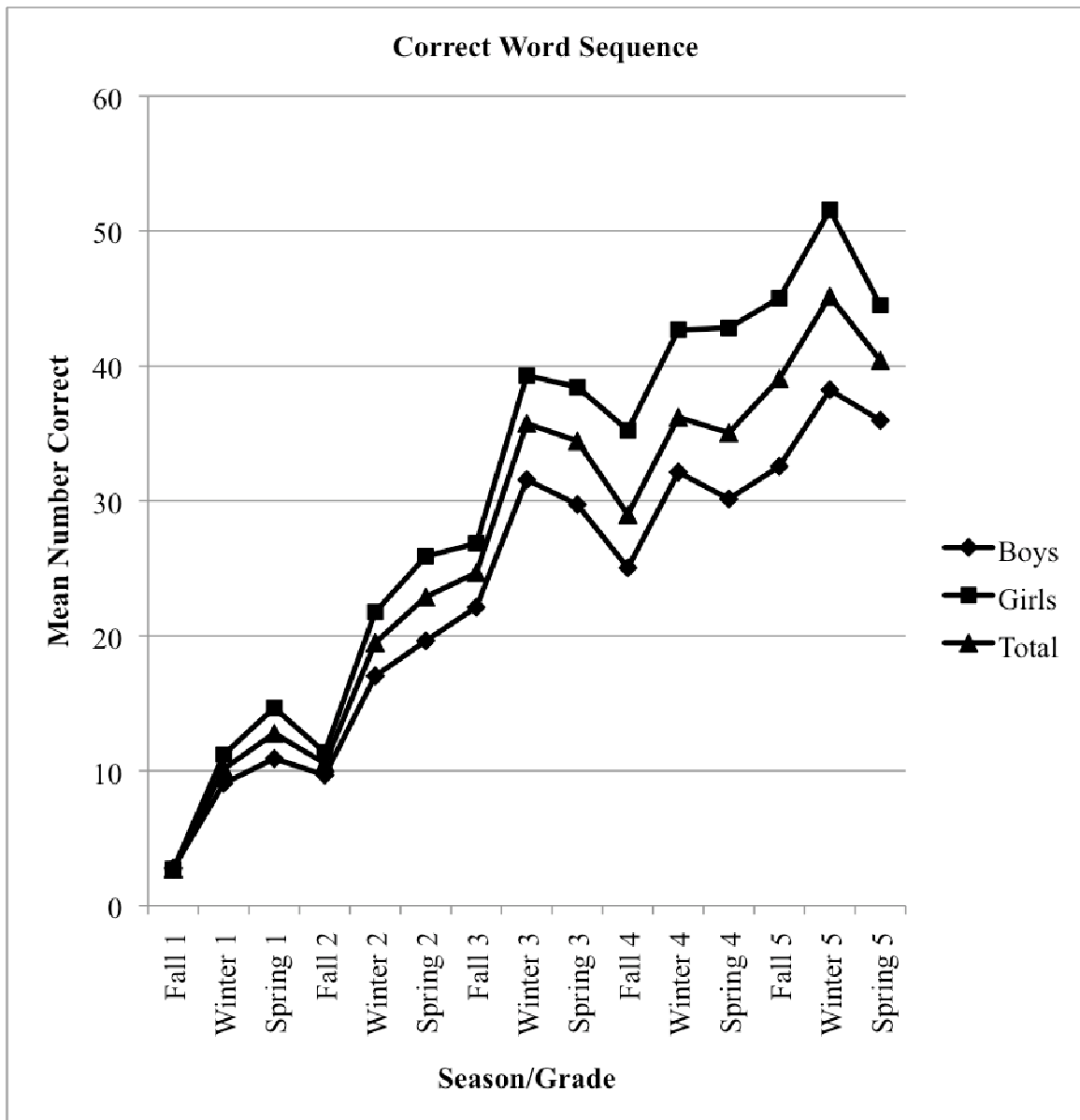


Figure 3. Overall Growth in Correct Word Sequences for Grades 1 Through 5.

Discussion

The purpose of this study was to examine growth rates in elementary-aged students' writing over the course of a school year, an area of research lacking in the literature. Three-minute writing samples were scored by the traditional CBM methods of counting the total number of words the student wrote, the total number of words the student spelled correctly, and the total number of correct word sequences. Average weekly growth rates by grade and gender were determined for grades 1 through 5 for a large sample of students.

The data obtained from this study can be used to set realistic standards for how much growth students typically make in writing during the elementary school years. By determining typical growth rates, educators will be able to track student progress and decide which students are not making typical rates of growth. These students can then be provided with the appropriate interventions to improve their writing skills. The data will also help educators determine if the interventions used to improve students' writing skills are making a difference beyond the growth students typically make under normal instructional circumstances. In addition, a few interesting findings were revealed based on the current analyses of the data set.

As found in a previous study (Ardoin & Christ, 2008), growth rates from fall to winter were higher than growth rates from winter to spring. For this reason, schools should consider using separate growth rates between fall and winter and winter and spring to more accurately consider typical rates of student progress. What is particularly interesting, and somewhat puzzling, is just how much higher the difference is between the first half and last half of the school year. For the last few months of school, students

in Grades 3, 4 and 5 actually dropped in scores, showing negative growth rates. It is unclear what would account for such a difference. Perhaps there is much less of an emphasis on the teaching of writing toward the end of the school year when schools may be more focused on state-wide accountability tests given every spring. Another possible explanation is that the students were unmotivated to produce their best efforts near the end of the school year, especially because they received no feedback or consequences for the first two writing probes (i.e., fall and winter administrations).

When discussing spelling growth rates, Hosp et al. (2007) noted that students typically make the most progress in spelling during the first few years in school. This seems to hold true for writing as well. By 5th grade, students generally showed little or no growth from fall to spring. Although negative growth rates were found in Grades 3, 4 and 5 between winter and spring, students in Grades 1 and 2 continued to make gains, albeit a much slower rate than fall to winter.

When examining the graphs of students' mean scores over the course of elementary school, there were a few large drops at different points in time. Drops in scores between Grades 1 and 2 and between Grades 3 and 4 are a little misleading in that different samples of students are represented at the different grade levels. Nonetheless, it appears students lose writing skills over the summer months. In addition, there was a large drop in growth between the winter and spring of 5th grade. It is unclear if such a drop would always be found in 5th graders during that time of the year or the decrease in scores was due to some other explanation (e.g., lack of motivation, uninteresting story starter).

Strengths and Limitations of the Study

Typical growth rates for CBM in reading, spelling, and math currently exist (Fuchs et al., 1993; Hosp et al., 2007). This study is the first to investigate growth rates in the CBM area of written expression. With these growth rates, educators will be able to monitor student progress in writing over time to determine if they are progressing adequately over the elementary school years.

Some of the previous research examining CBM-WE, including that of Jewell and Malecki (2005) and McMaster and Campbell (2008), used only two or three grade levels and much smaller sample sizes. In addition, their writing probes were only administered one or two times. A major strength of the current study is that three administrations of writing probes were given over the course of a school year using a large, diverse population of elementary students.

A common potential limitation of any study is that the results may not generalize to other school districts or regions across the United States, even though the students in the school district represented a fairly diverse sample. Schools that participated in this study are located in a mid-sized suburban city in the southeast. It is possible that schools in more urban or rural areas could find different results. Or, different results may occur in schools using different curriculums or written expression teaching strategies. A limitation to interpreting the data across the elementary years is that different samples of students were in the different grades. A multi-year longitudinal study would be needed to accurately assess and plot growth across school years. Such a method would help determine if students really do lose writing skills over the summer months.

Future Research

Longitudinal research on written expression growth rates was one suggestion for future research. Of course, such research would be very difficult to complete.

Determining growth rates in written expression across different regions of the United States is another possibility for future research in this area. Research replicating this study, conducted in different regions and school districts, will help provide a more accurate picture of average growth rates in written expression. Another area that needs further investigation is the finding that little to no growth occurs between winter and spring. Perhaps more frequent probes could be given (e.g., monthly) to determine exactly where the progress levels off. This lack of growth during the last months of school is somewhat of an alarming finding and if it is due to instructional practices in schools, steps need to be taken to address such an issue. Evaluating the possible impact motivation has on lower spring scores could easily be tested by repeating the assessments at mid-year and at the end of the school year while providing one group of students with external motivation to write well and another group no incentives.

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Appendix A

Story Starters

Fall

1st grade: I once had a magic pencil and...

2nd grade: One day, I became invisible and...

3rd grade: One day our teacher disappeared and...

4th grade: I stepped into the time machine and...

5th grade: My friend and I were walking by an old deserted house and...

Winter

1st grade: If I could fly I would...

2nd grade: The dog climbed on the table and...

3rd grade: I looked out the window and to my surprise...

4th grade: The lights went out and...

5th grade: I knew I was in trouble when I couldn't find...

Spring

1st grade: As he opened the door the...

2nd grade: One day my mom surprised me and brought home a...

3rd grade: The police officer stopped the driver for speeding and then...

4th grade: He crossed his fingers and opened the box. Suddenly...

5th grade: I saw colored lights in the sky and...

Appendix B

Human Subjects Review Board Approval



A LEADING AMERICAN UNIVERSITY WITH INTERNATIONAL REACH
HUMAN SUBJECTS REVIEW BOARD

In future correspondence, please refer to HS10-172, February 16, 2010

Dr. Carl Myers
Psychology
WKU

Dr. Carl Myers:

Your research project, *Scoring of Written Expression Curriculum Based Measurement Probes*, was reviewed by the HSRB and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects' welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the IRB found that you need to orient participants as follows: (1) signed informed consent is not required; (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data. (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

This project is therefore approved at the Exempt from Full Board Review Level.

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Sponsored Programs at the above address. Please report any changes to this approved protocol to this office. A Continuing Review protocol will be sent to you in the future to determine the status of the project. Also, please use the stamped approval forms to assure participants of compliance with The Office of Human Research Protections regulations.

Sincerely,

Paul J. Mooney, M.S.T.M.
Compliance Coordinator
Office of Sponsored Programs
Western Kentucky University



cc: HS file number Myers HS10-172

The Spirit Makes the Master

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